UNITED STATES PATENT AND TRADEMARK OFFICE

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ART UNIT	PAPER NUMBER
2167	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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		Application No.	Applicant(s)
Office Action Summary		10/803,443	BARRERA ET AL.
		Examiner	Art Unit
		NIRAV K. KHAKHAR	2167

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>19 May 2008</u>.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-6,8-11,13,14,17-22 and 24-42</u> is/are pending in the application.
   4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) <u>1-6,8-11,13,14,17-22 and 24-42</u> is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a) ☐ All b) ☐ Some * c) ☐ None of:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   A request for continued examination under 37 CFR 1.114, including the fee set

forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this

application is eligible for continued examination under 37 CFR 1.114, and the fee set

forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action

has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 19 May,

2008, has been entered.

Claim Rejections - 35 USC § 101

2.   35 U.S.C. § 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
> matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
> conditions and requirements of this title.

Claims 21, 22, and 24 – 33 are rejected under 35 U.S.C. § 101 because the claimed

invention is directed to non-statutory subject matter.

        Independent Claim 21 recites in part, "A computer-readable medium having

computer-executable instructions. . .". As per the specification, pages 24 – 25,

computer-readable media can include computer storage media and communication

media. Communication media are defined as modulated data signals such as a carrier

wave or other transport mechanism.

When nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal, it is not statutory since no requisite functionality is present to satisfy the practical application requirement. Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored in a computer-readable medium, in a computer, on an electromagnetic carrier signal does not make it statutory. See Diehr, 450 U.S. at 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in Benson were unpatentable as abstract ideas because "[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer."). Such a result would exalt form over substance. In re Sarkar, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978) ("[E]ach invention must be evaluated as claimed; yet semantogenic considerations preclude a determination based solely on words appearing in the claims. In the final analysis under § 101, the claimed invention, as a whole, must be evaluated for what it is.") (quoted with approval in Abele, 684 F.2d at 907, 214 USPQ at 687). See also In re Johnson, 589 F.2d 1070, 1077, 200 USPQ 199, 206 (CCPA 1978) ("form of the claim is often an exercise in drafting"). Thus, nonstatutory music is not a computer component and it does not become statutory by merely recording it on a compact disk. Protection for this type of work is provided under the copyright law.

Claims 22 and 24 - 33, which depend from Claim 21, fail to add any limitations which cure this deficiency, and are therefore also rejected.

Examiner applies prior art to these claims as best understood, under the

assumption that applicants will amend the claims to overcome this rejection in their next

official response.

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

Claims 1 – 6, 8 – 11, 13, 14, and 17 – 20 are rejected under 35 U.S.C. § 112, second

paragraph, as being indefinite for failing to particularly point out and distinctly claim the

subject matter which applicant regards as the invention.

The term "significantly" in claims 1 and 10 is a relative term which renders the

claim indefinite. The term "significantly" is not defined by the claim, the

specification does not provide a standard for ascertaining the requisite degree,

and one of ordinary skill in the art would not be reasonably apprised of the scope

of the invention.

Claims 2 – 6, 8, 9, 11, 13, 14, and 17 – 20 do not add any limitations to cure the

deficiency of the claims from which they depend, and are therefore also rejected.

Examiner applies prior art to these claims as best understood, under the

assumption that applicants will amend the claims to overcome this rejection in

their next official response.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 6, 9 – 11, 13, 14, 17, and 18 are rejected under 35 U.S.C. § 103(a) as being

unpatentable over Levy, et al., U.S. Pat. No. 6,088,524 (hereafter, "Levy"), in view of

IBM Technical Disclosure Bulletin, March 1990, "Multiple Indexed Access Path in a

Relational Database System", Vol. 32, Iss. 10B, pp. 388 – 392 (hereafter, "IBM").

As to **Claim 1**, Levy discloses: a system that facilitates query optimization in a

data repository, comprising the following computer0executable components

stored in a computer memory:

an optimizing component comprising at least a query component that receives a

query to be processed against data of the data repository, which query includes

an original predicate (col. 1, lines 28 – 36, referring to a query that includes a

predicate being posed to a relational database), the optimizing component

requests from a metadata engine an implication rule for a function on a given

column by sending the metadata engine an expression to which the function on a

column is to be compared, and a list of one or more indices that can be exploited

for the comparison (col. 6, lines 13 - 65, referring to a framework that generates

inferred predicates based on functions of columns);

the metadata engine generating one or more implied predicates based on at least an existing rule for the function on a column and the one or more indices (col. 6, lines 13 - 65, referring to a framework that generates inferred predicates based on functions of columns); and

a predicate component that processes the original predicate into one or more new predicates that include implied predicates, the implied predicate being processed against the data to return a best solution such that a total evaluation cost is reduced (col. 5, lines 14 - 24, referring to the system being used to optimize query resolution).

Levy does not appear to explicitly disclose: the implied predicate being selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by the contents of the one or more indices.

IBM discloses: the implied predicate being selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by the contents of the one or more indices (Part 1, referring to implied predicates being chosen by searching among the predicates for the best predicates on index keys to derive the best strategy of single index access).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy and IBM before him/her to have

modified the system of Levy with the basis for choosing the best predicate from

IBM, in order to derive a best strategy for query optimization.

As to **Claim 6**, Levy, as modified, discloses: the one or more new predicates

being considered cost-based alternatives that are utilized only if the evaluation

cost is reduces, otherwise they are discarded (Levy, Fig. 9, Item 94, showing

new predicates that are not useful in optimization being discarded).

As to **Claim 9**, Levy, as modified, discloses: a data repository optimizer

according to the system of claim 1 (Levy, col. 6, lines 53 - 67, referring to such an

optimizer).

As to **Claim 10**, Levy discloses: a system that facilitates query optimization in a

data repository, comprising the following computer-executable components

stored in a computer memory:

an optimizing component comprising at least a query component that receives a

query to be processed against data of the data repository, which query includes

an original predicate (col. 1, lines 28 – 36, referring to a query that includes a

predicate being posed to a relational database), the optimizing component

requests from a metadata engine an implication rule for a function on a given

column by sending the metadata engine an expression to which the function on a

column is to be compared, and a list of one or more indices that can be exploited

for the comparison (col. 6, lines 13 - 65, referring to a framework that generates inferred predicates based on functions of columns);

the metadata engine generating at least an implied predicate based at least on an existing implication rule for the function on a column and the one or more indices (col. 6, lines 13 - 65, referring to a framework that generates inferred predicates based on functions of columns); and

a predicate component that processes the original predicate into one or more new predicates that include at least an implied predicate, the implied predicate being processed against the data to return a best solution such that a total evaluation cost is reduced (col. 5, lines 14 - 24, referring to the system being used to optimize query resolution).

Levy does not appear to explicitly disclose: the implied predicate being selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by the contents of the one or more indices.

IBM discloses: the implied predicate being selected from the one or more implied predicates based at least on a determination of the predicate being used in index-seek operation or covered by the contents of the one or more indices (Part 1, referring to implied predicates being chosen by searching among the predicates for the best predicates on index keys to derive the best strategy of single index access).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy and IBM before him/her to have modified the system of Levy with the basis for choosing the best predicate from IBM, in order to derive a best strategy for query optimization.

As to **Claim 11**, Levy, as modified, discloses: the implied predicate being considered cost-based alternatives that are discarded if the evaluation cost is not reduced (Levy, Fig. 9, Item 94, showing new predicates that are not useful in optimization being discarded).

As to **Claim 13**, Levy, as modified, discloses: a server that employs the system of claim 10 (Background, referring to database systems in general).

As to **Claim 14**, Levy, as modified, discloses: the predicate component generating an expression using the one or more new predicates, which expression is used to obtain the implication rule that is associated with at least the function on a given column (col. 6, lines 13 - 65, referring to a framework that generates inferred predicates based on functions of columns).

As to **Claim 17**, Levy, as modified, discloses: making an inference based on one or more parameters related to at least a cost-basis evaluation (Levy, Fig. 9, Item 94, showing new predicates that are not useful in optimization being discarded).

As to **Claim 18**, Levy, as modified, discloses: the total evaluation cost including

employing the one or more new predicates only if optimization is increase (Levy,

Fig. 9, Item 94, showing new predicates that are not useful in optimization being

discarded).

5.   Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy, in

view of IBM, as applied to Claim 1 above, further in view of Larson, et al., U.S. Pat. No.

6,381,616 (hereafter, "Larson '616").

As to **Claim 2**, Levy, as modified, does not appear to explicitly disclose: the

predicate component processing the original predicate to obtain an equivalent

predicate.

Larson '616 discloses: the predicate component processing the original predicate

to obtain an equivalent predicate (col. 11, lines 13 – 17, allowing the query

processor to obtain from the query the same results that would have been

returned had the query not been optimized).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Larson '616 before him/her,

to have further modified the system of Levy with the equivalent predicates of

Larson '616, in order to obtain from the query the same results that would have

been returned had the query not been optimized.

6.   Claims 3 – 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over

Levy, in view of IBM, further in view of Larson, et al., U.S. PG-Pub. No. 2003/0093415

(hereafter, "Larson '415").

As to **Claim 3**, Levy, as modified, does not appear to explicitly disclose the

limitation of: the predicate component processing the original predicate to obtain

a residual predicate.

Larson '415 discloses: the predicate component processing the original predicate

to obtain a residual predicate ([0089], ensuring that unused predicates are

maintained).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Larson '415 before him/her,

to have further modified the system of Levy with the residual predicates of Larson

'415, in order to ensure that unused predicates are maintained in the query

processing.

As to **Claim 4**, Levy, as modified, does not appear to explicitly disclose the

limitation of: the query being a previously processed query that is unmatched.

Larson '415 discloses: the query being a previously processed query that is

unmatched ([0089], ensuring that unused predicates are maintained).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Larson '415 before him/her, to have further modified the system of Levy with the residual predicates of Larson '415, in order to ensure that unused predicates are maintained in the query processing.

As to **Claim 5**, Levy, as modified, does not appear to explicitly disclose the limitation of: the one or more new predicates able to be used for standard indices and multi-valued indices.

Larson '415 discloses: the one or more new predicates able to be used for standard indices and multi-valued indices ([0134], allowing a newly created predicate to be used for building and searching a lattice index).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Larson '415 before him, to have further modified the system of Levy with the standard and multi-valued index use of Larson '415, in order to allow a newly created predicate to be used for building and searching a lattice index.

7.   Claims 8 and 42 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy, in view of IBM, further in view of Dessloch, et al., U.S. Pat. No. 6,338,056 (hereafter, "Dessloch").

As to **Claim 8**, Levy, as modified, does not appear to explicitly disclose the limitation of the query being processed against a data type that is a non-indexable type.

Dessloch discloses: the query being processed against a data type that is a non-indexable type (col. 13, lines 47 – 56, allowing data types that are not indexable to be indexed and queried).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Dessloch before him/her, to have further modified the system of Levy with the type-indexability of Dessloch, in order to make non-indexable data types indexable and able to be queried.

As to **Claim 42**, Levy, as modified, does not appear to explicitly disclose: the metadata component employing an indexed computed column that utilizes the column when the column is non-indexable.

Dessloch discloses: the metadata component employing an indexed computed column that utilizes the column when the column is non-indexable (col. 13, lines 47 – 56, allowing data types that are not indexable to be indexed and queried).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Dessloch before him/her, to have further modified the system of Levy with the type-indexability of Dessloch, in order to make non-indexable data types indexable and able to be queried.

8.   Claims 19, 21, 22, 32, 34 and 40 are rejected under 35 U.S.C. § 103(a) as being

unpatentable over Levy, in view of IBM, further in view of Lin, et al., U.S. Pat. No.

6,675,159 (hereafter, "Lin").

As to **Claim 19**, Levy, as modified, does not appear to explicitly disclose the

limitation of: the query being one for which there is no exact match between

search predicates and index keys.

Lin discloses: the query being one for which there is no exact match between

search predicates and index keys (col. 21, lines 19 – 21, increasing versatility of

the query optimizer).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Lin before him/her, to have

further modified the system of Levy with the query attributes of Lin, in order to

increase the versatility of the query optimizer.

As to **Claim 21**, Levy discloses: a computer-readable medium having computer-

executable instructions for performing a method for optimizing a search query,

the method comprising:

reducing the original predicate into at least an implied predicate (col. 6, lines 13 -

65, referring to a framework that generates inferred predicates based on

functions of columns);

requesting an implication rule for a function of a column by transmitting at least

one of an expression to which the function on a column is to be compared and a

list of one or more standard indices that could be utilized for the comparison (col.

6, lines 13 - 65, referring to a framework that generates inferred predicates based

on functions of columns);

processing at least the implied predicate against data of a data repository to

obtain search results based at least on an implication rule for the function on a

column is to be compared and the one or more indices (col. 6, lines 13 - 65,

referring to a framework that generates inferred predicates based on functions of

columns); and

analyzing the search results to output a best solution (col. 5, lines 14 - 24,

referring to the system being used to optimize query resolution).

Levy does not appear to explicitly disclose: receiving a query for whose original

predicate there is no exact match to an index key; or the best solution being

based at least on a determination that the implied predicate is used in index-seek

operation or covered by the contents of one or more indices.

Lin discloses: receiving a query for whose original predicate there is no exact

match to an index key (col. 21, lines 19 – 21, increasing versatility of the query

optimizer).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Lin before him/her, to have

further modified the system of Levy with the query attributes of Lin, in order to increase the versatility of the query optimizer.

Levy, as modified, does not appear to explicitly disclose: the best solution being based at least on a determination that the implied predicate is used in index-seek operation or covered by the contents of one or more indices.

IBM discloses: the best solution being based at least on a determination that the implied predicate is used in index-seek operation or covered by the contents of one or more indices (Part 1, referring to implied predicates being chosen by searching among the predicates for the best predicates on index keys to derive the best strategy of single index access).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy and IBM before him/her to have modified the system of Levy with the basis for choosing the best predicate from IBM, in order to derive a best strategy for query optimization.

As to **Claim 22**, Levy, as further modified, discloses: requesting the implication rule for a function on a column (col. 6, lines 13 - 65, referring to a framework that generates inferred predicates based on functions of columns).

As to **Claim 32**, Levy, as further modified, discloses: performing a cardinality estimation using at least the implied predicate (Levy, Fig. 9, Item 94, showing new predicates that are not useful in optimization being discarded).

As to **Claim 34**, Levy discloses: a system that facilitates query optimization in a

data repository, comprising the following means stored in a computer memory:

means for reducing the original predicate into at least an implied predicate (col.

6, lines 13 - 65, referring to a framework that generates inferred predicates based

on functions of columns);

means for requesting an implication rule for a function on a column; means for

transmitting at least one of an expression to which a function on a column is to

be compared and a list of standard indices that could be exploited (col. 6, lines

13 - 65, referring to a framework that generates inferred predicates based on

functions of columns);

means for processing at least the implied predicate against data of a data

repository to obtain search results (col. 6, lines 13 - 65, referring to a framework

that generates inferred predicates based on functions of columns); and

means for analyzing the search results and outputting a best solution (col. 5,

lines 14 - 24, referring to the system being used to optimize query resolution).

Levy does not appear to explicitly disclose: means for receiving a query for

whose original predicate there is no exact match; or the best solution being

based at least on a determination that the implied predicate is used in index-seek

operation or covered by contents of the standard index.

Lin discloses: means for receiving a query for whose original predicate there is no exact match (col. 21, lines 19 – 21, increasing versatility of the query optimizer).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Lin before him/her, to have further modified the system of Levy with the query attributes of Lin, in order to increase the versatility of the query optimizer.

Levy, as modified, does not appear to explicitly disclose: the best solution being based at least on a determination that the implied predicate is used in index-seek operation or covered by the contents of one or more indices.

IBM discloses: the best solution being based at least on a determination that the implied predicate is used in index-seek operation or covered by the contents of one or more indices (Part 1, referring to implied predicates being chosen by searching among the predicates for the best predicates on index keys to derive the best strategy of single index access).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy and IBM before him/her to have modified the system of Levy with the basis for choosing the best predicate from IBM, in order to derive a best strategy for query optimization.

As to **Claim 40**, Levy, as further modified, discloses: means for estimating

cardinality using at least the implied predicate (Levy, Fig. 9, Item 94, showing

new predicates that are not useful in optimization being discarded).

9.   Claim 20 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy,

in view of IBM, as applied to Claim 10, further in view of Reiner, et al., U.S. Pat. No.

5,742,806 (hereafter, "Reiner").

As to **Claim 20**, Levy, as modified, does not appear to explicitly disclose: the

implied predicate exactly matching an index key.

Reiner discloses: the implied predicate exactly matching an index key (col. 43,

increasing the usefulness of the new predicate).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Reiner before him/her to

have further modified the system of Levy with the exact key matching of Reiner,

in order to increase the usefulness of the new predicate.

10.   Claims 24, 28, 29, 38, 39, and 41 are rejected under 35 U.S.C. § 103(a) as being

unpatentable over Levy, in view of IBM and Lin, as applied to Claim 21, yet further in

view of Larson '415.

As to **Claim 24**, Levy, as further modified, does not appear to explicitly disclose: removing the implied predicate if it does not exploit one of the standard or multi-value indices.

Larson '415 discloses: removing the implied predicate if it does not exploit one of the standard or multi-value indices ([0134], allowing a newly created predicate to be used for building and searching a lattice index).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Larson '415 before him, to have further modified the system of Levy with the standard and multi-valued index use of Larson '415, in order to allow a newly created predicate to be used for building and searching a lattice index.

As to **Claim 28**, Levy, as further modified, does not appear to explicitly disclose: processing the original predicate to generate a residual predicate that refines the search.

Larson '415 discloses: processing the original predicate to generate a residual predicate that refines the search ([0089], ensuring that unused predicates are maintained).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Larson '415 before him/her, to have further modified the system of Levy with the residual predicates of Larson

'415, in order to ensure that unused predicates are maintained in the query

processing.

As to **Claim 29**, Levy, as yet further modified, discloses: processing the residual

predicate after the act of processing at least the implied predicate (Larson '415,

[0089], ensuring that unused predicates are maintained).

As to **Claim 38**, Levy, as further modified, does not appear to explicitly disclose:

means for processing the original predicate to generate a residual predicate that

refines the search.

Larson '415 discloses: means for processing the original predicate to generate a

residual predicate that refines the search ([0089], ensuring that unused

predicates are maintained).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Larson '415 before him/her,

to have further modified the system of Levy with the residual predicates of Larson

'415, in order to ensure that unused predicates are maintained in the query

processing.

As to **Claim 39**, Levy, as yet further modified, discloses: means for processing

the residual predicate after the act of processing at least the implied predicate

(Larson '415, [0089], ensuring that unused predicates are maintained).

As to **Claim 41**, Levy, as further modified, does not appear to explicitly disclose: means for removing the implied predicate if it does not exploit one of the standard or multi-valued indices.

Larson '415 discloses: means for removing the implied predicate if it does not exploit one of the standard or multi-value indices ([0134], allowing a newly created predicate to be used for building and searching a lattice index).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, and Larson '415 before him, to have further modified the system of Levy with the standard and multi-valued index use of Larson '415, in order to allow a newly created predicate to be used for building and searching a lattice index.

11.   Claims 25, 26, 35 and 36 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy, in view of IBM and Lin, yet further in view of Pauschine, et al., U.S. Pat. No. 5,918,232 (hereafter, "Pauschine").

As to **Claim 25**, Levy, as further modified, does not appear to explicitly disclose: employing a new ad-hoc exploratory rule for an individual operator of the original predicate.

Pauschine discloses: employing a new ad-hoc exploratory rule for an individual operator of the original predicate (col. 18, lines 58 – 67, enabling versatility of rules and predicates).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, Lin, and Pauschine before him/her, to have yet further modified the system of Levy with the ad-hoc exploratory rules of Pauschine, in order to enable versatility of rules and predicates.

As to **Claim 26**, Levy, as yet further modified, discloses: analyzing at least the implied predicate with the exploratory rule (Pauschine, col. 18, lines 58 – 67).

As to **Claim 35**, Levy, as further modified, does not appear to explicitly disclose: means for employing a new ad-hoc exploratory rule for an individual operator of the original predicate.

Pauschine discloses: means for employing a new ad-hoc exploratory rule for an individual operator of the original predicate (col. 18, lines 58 – 67, enabling versatility of rules and predicates).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, Lin, and Pauschine before him/her, to have yet further modified the system of Levy with the ad-hoc

exploratory rules of Pauschine, in order to enable versatility of rules and predicates.

As to **Claim 36**, Levy, as yet further modified, discloses: means for analyzing at least the implied predicate with the exploratory rule (Pauschine, col. 18, lines 58 – 67).

12.   Claims 27, 30 and 37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy, in view of IBM and Lin, yet further in view of Paulley, et al., U.S. Pat. No. 6,665,664 (hereafter, "Paulley").

As to **Claim 27**, Levy, as further modified, does not appear to explicitly disclose: requesting a list of tentative substitutes with predicates that involve nested queries; including the substitutes into the query to form a new expression; simplifying the new expression; removing nested queries; or generating new alternatives for the search.

Paulley discloses: requesting a list of tentative substitutes with predicates that involve nested queries (col. 13, lines 1 – 13); including the substitutes into the query to form a new expression; simplifying the new expression (col. 13, lines 1 – 13); removing nested queries; and generating new alternatives for the search (col. 17, lines 48 – 64, supplying an additional method of simplifying a complex query).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, IBM, Lin, and Paulley before him/her to have yet further modified the system of Levy with the substitution and replacement of predicates from Paulley, in order to supply an additional method of simplifying a complex query.

As to **Claim 30**, Levy, as further modified, does not appear to explicitly disclose: adding the implied predicate to the original predicate and searching for the best solution.

Paulley discloses: adding the implied predicate to the original predicate and searching for the best solution (Paulley, col. 13, lines 1 – 13, and col. 17, lines 48 – 64, supplying an additional method of optimizing a query).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, Lin, IBM, and Paulley before him/her to have yet further modified the system of Levy with the concatenation of predicates from Paulley, in order to supply an additional method of optimizing a query.

As to **Claim 37**, Levy, as further modified, does not appear to explicitly disclose: means for requesting a list of tentative substitutes with predicates that involve nested queries; means for including the substitutes into the query to form a new

expression; means for simplifying the new expression; means for removing

nested queries; or means for generating new alternatives for the search.

Paulley discloses: means for requesting a list of tentative substitutes with

predicates that involve nested queries (col. 13, lines 1 – 13);

means for including the substitutes into the query to form a new expression;

means for simplifying the new expression (col. 13, lines 1 – 13);

means for removing nested queries; and means for generating new alternatives

for the search (col. 17, lines 48 – 64, supplying an additional method of

simplifying a complex query).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, Lin, and Paulley before him/her

to have yet further modified the system of Levy with the substitution and

replacement of predicates from Paulley, in order to supply an additional method

of simplifying a complex query.

13.   Claim 31 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy,

in view of IBM and Lin, yet further in view of Larson '616.

As to **Claim 31**, Levy, as further modified, does not appear to explicitly disclose:

replacing the original predicate with the equivalent predicate and searching for

the best solution.

Larson '616 discloses: replacing the original predicate with the equivalent

predicate and searching for the best solution (col. 11, lines 13 – 17, allowing the

query processor to obtain from the query the same results that would have been

returned had the query not been optimized).

It would have been obvious to one having ordinary skill in this art at the time of

the invention, having the teachings of Levy, IBM, and Larson '616 before him/her,

to have further modified the system of Levy with the equivalent predicates of

Larson '616, in order to obtain from the query the same results that would have

been returned had the query not been optimized.

14.   Claim 33 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Levy,

in view of IBM and Lin, yet further in view of Leslie.

As to **Claim 33**, Levy, as further modified, does not appear to explicitly disclose:

creating an index based on an index extension scheme, which scheme includes

at least one of, providing a key column of a data type that corresponds to a data

type being indexed; providing a set of parameters; and providing a table-valued

function name that is used to generate an index entry for a value of the column

being indexed.

Leslie discloses: creating an index based on an index extension scheme, which

scheme includes at least one of, providing a key column of a data type that

corresponds to a data type being indexed; providing a set of parameters; and

providing a table-valued function name that is used to generate an index entry for a value of the column being indexed (col. 1, lines 21 – 37, enabling pertinent records to be accessed at a minimum cost).

It would have been obvious to one having ordinary skill in this art at the time of the invention, having the teachings of Levy, Lin, IBM, and Lesle before him/her, to have further modified the system of Levy with the indexing scheme of Leslie, in order to enable pertinent records to be accessed at a minimum cost.

Response to Arguments

15.   Applicant's arguments filed 18 January, 2008, have been fully considered but they are not persuasive.

Applicants argument alleges that Levy, in combination with IBM, fails to disclose the limitation of an optimizing component requests a metadata engine an implication rule for a given column, or for a function on a given column, by sending the metadata engine an expression to which the column or function on a column is to be compared, and a list of one or more indices that can be exploited. Support for this allegation comes from page 20 of the Final Office Action, in which Examiner stated that Levy does not teach or suggest requesting an implication rule for a column or function of the column by transmitting an expression to which the column or function of the column is to be compared.

However, as can be seen in the detailed rejections above, and at Levy, col. 6,

lines 13 – 65, these allegations are incorrect. This section of Levy, when

examined closely, shows that predicates that are inferred or derived from original

predicates are generated and represented via rules upon functions of columns or

tuples.

All of applicants' further arguments rely on the supposed failing of Levy in

combination with IBM, and are therefore considered moot, in view of the

arguments above.

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to NIRAV K. KHAKHAR whose telephone number is

(571)270-1004. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, John R. Cottingham can be reached on (571) 272-7079. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

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